

The Second State of Natural Resources Report (SoNaRR2020)

Assessment of the Achievement of SMNR Aim 3: Wales has Healthy Places for People, Protected from Environmental Risks.

Natural Resources Wales

Final Report

Mae'r ddogfen hon hefyd ar gael yn Gymraeg

About Natural Resources Wales

Natural Resources Wales’s purpose is to pursue sustainable management of natural resources. This means looking after air, land, water, wildlife, plants and soil to improve Wales’s well-being, and provide a better future for everyone.

Evidence at Natural Resources Wales

Natural Resources Wales is an evidence-informed organisation. We seek to ensure that our strategy, decisions, operations and advice to Welsh Government and others are underpinned by sound and quality-assured evidence. We recognise that it is critically important to have a good understanding of our changing environment.

We will realise this vision by:

- Maintaining and developing the technical specialist skills of our staff;
- Securing our data and information;
- Having a well-resourced proactive programme of evidence work;
- Continuing to review and add to our evidence to ensure it is fit for the challenges facing us; and
- Communicating our evidence in an open and transparent way.

Title: **SoNaRR2020 Aim 3: Wales has Healthy Places for People, Protected from Environmental Risks**

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The Second State of Natural Resources Report (SoNaRR2020) contents

This document is one of a group of products that make up the second State of Natural Resources Report (SoNaRR2020). The full suite of products are:

Executive Summary. Foreword, Introduction, Summary and Conclusions. Published as a series of webpages in December 2020

The Natural Resource Registers. Drivers, Pressures, Impacts and Opportunities for Action for eight Broad Ecosystems. Published as a series of PDF documents and as an interactive infographic in December 2020

Assessments against the four Aims of SMNR. Published as a series of PDF documents in December 2020:

SoNaRR2020 Aim 1. Stocks of Natural Resources are Safeguarded and Enhanced

SoNaRR2020 Aim 2. Ecosystems are Resilient to Expected and Unforeseen Change

SoNaRR2020 Aim 3. Wales has Healthy Places for People, Protected from Environmental Risks

SoNaRR2020 Aim 4. Contributing to a Regenerative Economy, Achieving Sustainable Levels of Production and Consumption

The SoNaRR2020 Assessment of Biodiversity. Published in March 2021

Assessments by Broad Ecosystem. Published as a series of PDF documents in March 2021:

Assessment of the Achievement of SMNR: Coastal Margins

Assessment of the Achievement of SMNR: Enclosed Farmland

Assessment of the Achievement of SMNR: Freshwater

Assessment of the Achievement of SMNR: Marine

Assessment of the Achievement of SMNR: Mountains, Moorlands and Heaths

Assessment of the Achievement of SMNR: Woodlands

Assessment of the Achievement of SMNR: Urban

Assessment of the Achievement of SMNR: Semi-Natural Grassland

Assessments by Cross-cutting theme. Published as a series of PDF documents in March 2021:

Assessment of the Achievement of SMNR: Air Quality

Assessment of the Achievement of SMNR: Climate Change

Assessment of the Achievement of SMNR: Energy Efficiency

Assessment of the Achievement of SMNR: Invasive Non-native Species

Assessment of the Achievement of SMNR: Land use and Soils

Assessment of the Achievement of SMNR: Waste

Assessment of the Achievement of SMNR: Water Efficiency

Updated SoNaRR evidence needs. Published in March 2021

Acronyms and Glossary of terms. Published in December 2020 and updated in March 2021

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Introduction to the four aims of SMNR

SoNaRR2020 assesses Wales’s progress towards SMNR individually against four aims of SMNR, but it is important to note that they are inextricably linked and should not be seen in isolation (Figure 1). Wales cannot work towards healthy places for people without resilient ecosystems and cannot make our ecosystems resilient without safeguarding stocks of natural resources. The regenerative economy safeguards and restores those stocks and is the route to the transformational change needed to achieve SMNR.

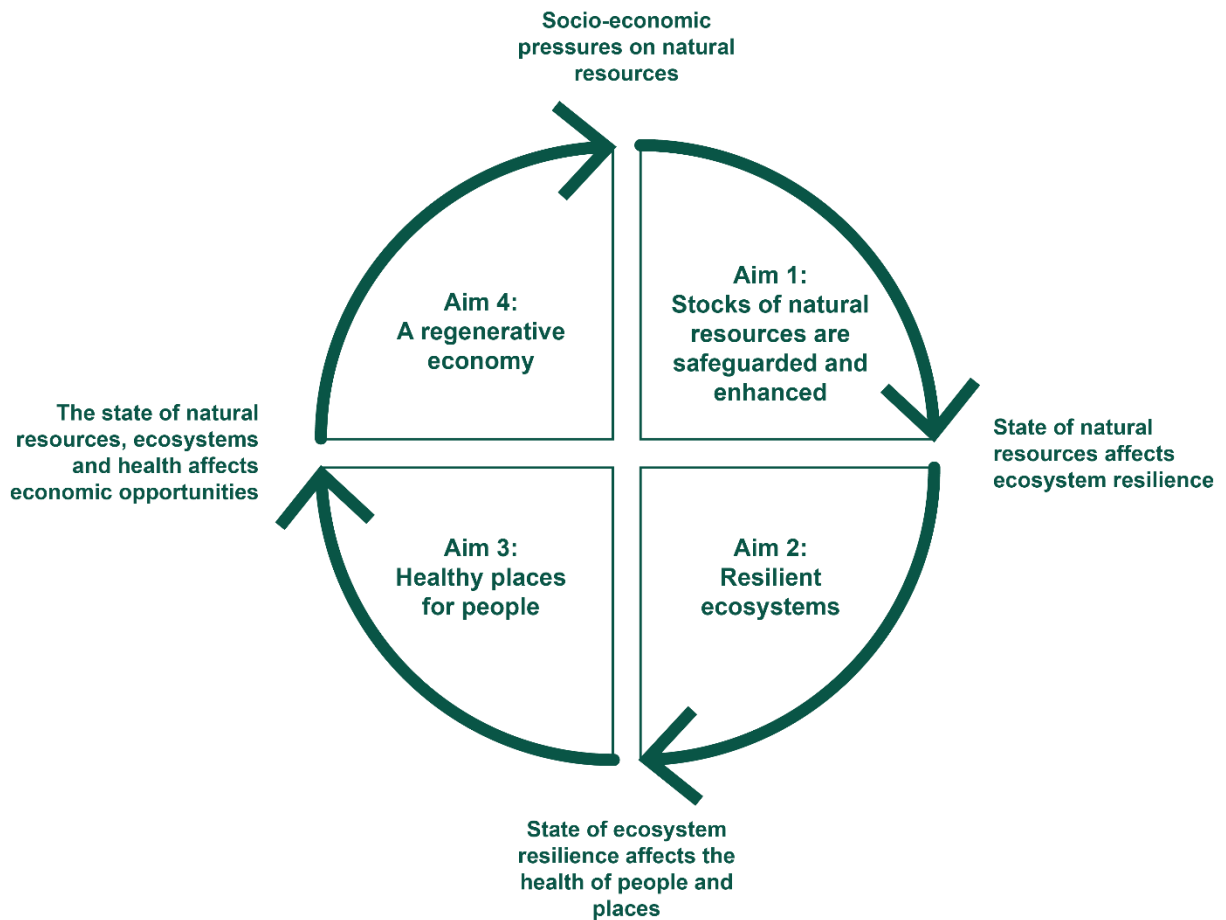


Figure 1 The linkages and cyclical nature of the four aims of SMNR.

SMNR Aim 3: Wales has Healthy Places for People, Protected from Environmental Risks.

Success would see transformational change undertaken to reverse the climate and nature emergencies to ensure the health and resilience of our ecosystems, thereby pre-empting and preventing disease, ill-health and avoidable death caused by environmental hazards. The success of SMNR Aims 1, 2 and 4 are fundamental to the success of Aim 3.

Healthy places for people include (but are not limited to):

- Freedom from environmental hazards such as flooding
- Pollution at levels which do not impact peoples health and wellbeing
- Connected, mixed use neighbourhoods with equitable access to services and amenities that encourage physical activity, energy efficiency, social interactions, play, learning and working opportunities.
- Accessible, high quality green infrastructure and spaces that provide opportunities for physical activity, relaxation and community cohesion

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Summary

The natural environment provides us with the things we need to live and thrive: the air we breathe, the water we drink and the food we eat. It provides us with energy and protects against environmental hazards such as poor air quality. The natural environment provides places and spaces for interactions with others and healthy living, working, learning and playing are enhanced by access to good quality natural environments. The outdoors provides opportunity for participation in physical activity and connecting with the natural environment provides mental health benefits. Success would see the sustainable management, including regulation, of natural resources making people healthier and everyone's lives more enriched.

COVID-19 and the subsequent government response have had and continue to have an on-going profound effect on the everyday lives of everyone. As the situation continues to evolve, it has become increasingly clear that both the disease and the response across the UK are having wide-ranging impacts on the health and well-being of the population. Many of these impacts are significant and will extend beyond the short term.

Healthy and resilient ecosystems are a pre-requisite for healthy and resilient lives. The evidence indicates that, in the more deprived communities of Wales particularly, more still needs to be done to reduce inequality and inequity of access to, and benefit from, natural resources. Here, the focus on places include (but not limited to):

- Coast and rivers
- Woodlands
- Urban areas
- Other green and blue spaces, including coastal and marine areas

The ability to create and sustain healthy places for people, protected from environmental risks and capable of increasing well-being, is determined by the understanding of the challenges posed by these risks and the response to them.

In Wales, we benefit from legislation in the form of the Well-being of Future Generations Act of 2015 and the Environment Act of 2016. Taken together, they give public authorities a duty to place well-being and sustainable development at the heart of everything they do.

This chapter combines the ecosystem services approach with the determinants of health model to help decision makers ensure multiple benefits can be provided to both people and place.

Following an assessment of the issues relating to healthy places, four areas of focus have emerged as necessary for achieving healthy places for people, protected from environmental risks. Opportunities for action are:

- Establishing equal and sustainable communities
- Establishing healthy, active, connected communities
- Promoting green growth and innovation for healthy communities
- Increasing resource efficiency and moving toward a regenerative economy

Introduction: Assessing healthy places in Wales

Globally, human influences on the environment continue to grow. Many of the resulting impacts are continuously generating disease and injury, impacting quality of life, reducing productivity, and placing increasing pressure on health systems. More sustainable ways of functioning, as individuals and as societies, go hand in hand with creating healthier and more resilient environments, with an enhanced focus on ill-health prevention through action on the root causes of disease.

[Aim 2 – Ecosystem Resilience](#) defines ecosystem resilience as the capacity of an ecosystem to respond to disturbances and demands by resisting, recovering or adapting to them, whilst still being able to deliver services and benefits into the future (Walker and Salt, 2012).

Public Health Wales (PHW) (2019a) defines human and ecosystem resilience in the following general way. It is:

“the ability of an individual, a community and system to withstand stress and challenges (Ziglio et al., 2017). It encompasses both the ability to adapt and survive adverse circumstances (such as environmental, societal, or economic shocks), or to cope and thrive given the challenges of everyday life. At an individual level, resilience has been linked to mental and physical health across the life course (Hughes et al., 2018; Friedli and World Health Organisation, 2009) and the benefits of a resilient population has been suggested to extend beyond health to wider societal and economic outcomes (Alexander et al., 2010)”.

Both definitions include the concepts of adaptation; resistance; recovery; coping and thriving. We include the Public Health Wales definition here to emphasise that human health also requires resilience and that environmental resilience is inextricably linked to that of human health and well-being.

The ability of environments to continue to provide goods and services that help to create and maintain healthy places and people is determined by their diversity, extent, condition, connectivity and other aspects of ecosystem resilience ([see Aim 2 - Ecosystems Resilience](#)) coupled with the interactions of people with their surroundings. In turn these are affected by background pressures, management practices and drivers of demand.

Human health ultimately depends on these ecosystem services. These are made possible by biodiversity and the products and benefits derived from them. They include food and fresh water; regulation of climate, floods and disease; opportunities for physical activity; for living, learning, working and playing and for aesthetic and cultural enrichment.

On a global scale, known and avoidable environmental risks cause around one quarter of all deaths and disease burdens, amounting to approximately 13 million deaths annually. Air pollution alone causes seven million preventable deaths per

year with more than 90% of people breathing polluted air, and almost 3,000 million people still reliant on using polluting fuels (World Health Organisation, 2020a).

The overarching risks of climate change and biodiversity loss increasingly effect people's health and well-being. Climate change is increasing the frequency and intensity of extreme weather events including heatwaves, drought and severe storms, and is modifying the transmission of infectious diseases. This continues to result in substantial impacts on human health including the significant flood events in 2019/2020 and rising temperatures exacerbating urban heat island effects. Global warming of more than 1.5°C above pre-industrial levels will undermine life support systems for humanity. If the world warms by 2°C one in 20 species will be threatened with extinction (Intergovernmental Panel on Climate Change, 2018).

It is clear from the arguments above that ecosystem resilience and human resilience are intrinsically linked. Furthermore, the policies and programmes aimed at maintaining and improving resilience must be broader than those relating specifically to human health and environmental management. Examples include policy choices in energy generation, agricultural practices, business and land use planning leading to increased emissions, harmful exposure or greater vulnerability, which in turn can foster unhealthy behaviours and accelerate climate change.

Key socio-economic challenges and wider determinants of health

The total population of Wales is expected to increase to 3.3 million by 2039 if current trends continue, with a significant increase of people over the age of 65. Eighty percent of the population now live in the towns and cities that cover approximately 10% of land, while agricultural use covers over 80% including forest and woodland which accounts for 15% of all land (including that within the urban domain). Urban ecosystems are where human activity and resource use are concentrated, with some estimates suggesting they account for 75% of global resource consumption (UNEP, 2014). Urban areas are more likely to foster living environments that lead to obesity and other unhealthy behaviours, often providing limited access to natural environments and high-quality green and blue space, increasing exposure to environmental risk.

Average life expectancy in Wales is 78 years for men and 82 years for women, but people are likely to spend on average 17 and 20 years respectively living in poor health, as illustrated in Figure 2, below. There are stark differences in life expectancy and healthy life expectancy across Wales which have shown no sign of reducing over the past 10 years.

Evidence shows that low-income areas suffer not only from issues associated with poor housing, lower educational attainment and poor diet, but also less access to good quality green and blue space, all of which contribute to poor health. Men and women in the most deprived areas of Wales spend approximately 19 and 18 years less in good health and die on average 9 and 7 years earlier respectively, than those living in the least deprived areas.

Evidence emerging during and after the initial introduction of COVID-19 control measures indicates people living on low incomes, who were least active before the COVID-19 pandemic, are finding it harder to be physically active during the pandemic. Those living in urban environments, where access to green and blue space is limited, are being exposed to the most impact on their physical and mental health. This has also worsened for those people who were not in good health prior to the COVID-19 pandemic (NRW, 2020, Unpublished).

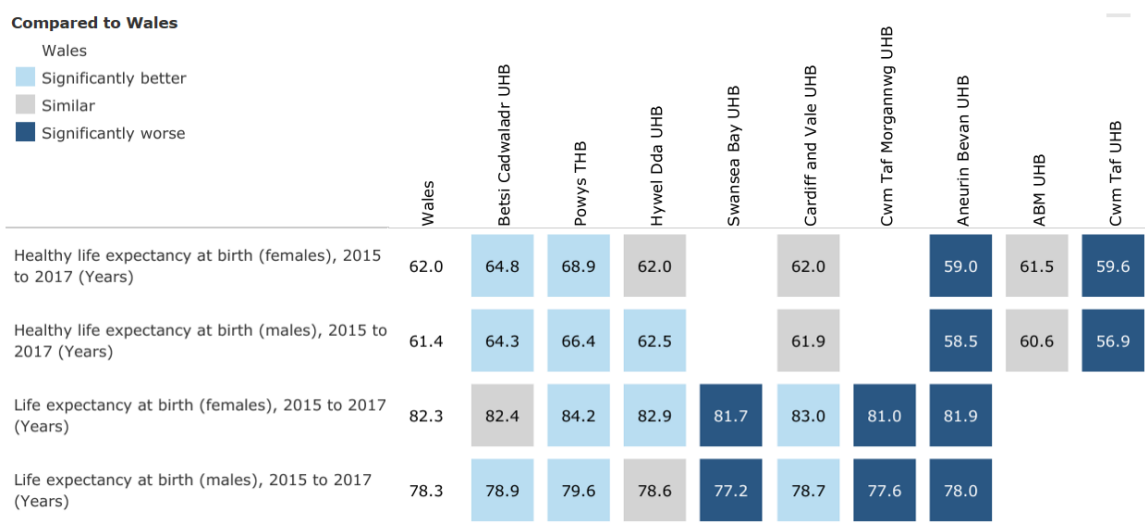


Figure 2 Years of life and years of health

Source: [Public Health Wales, 2020](#). Consult the [technical guide](#) for full details on how these indicators are calculated and data sources.

Adults living in the most deprived areas are less able to afford everyday goods and services and less likely to experience a sense of community. Around one in five 19 to 24 year-olds in Wales are not in education, employment or training. Overall a quarter of children in Wales live in poverty, but in some areas, this rises to almost 66%.

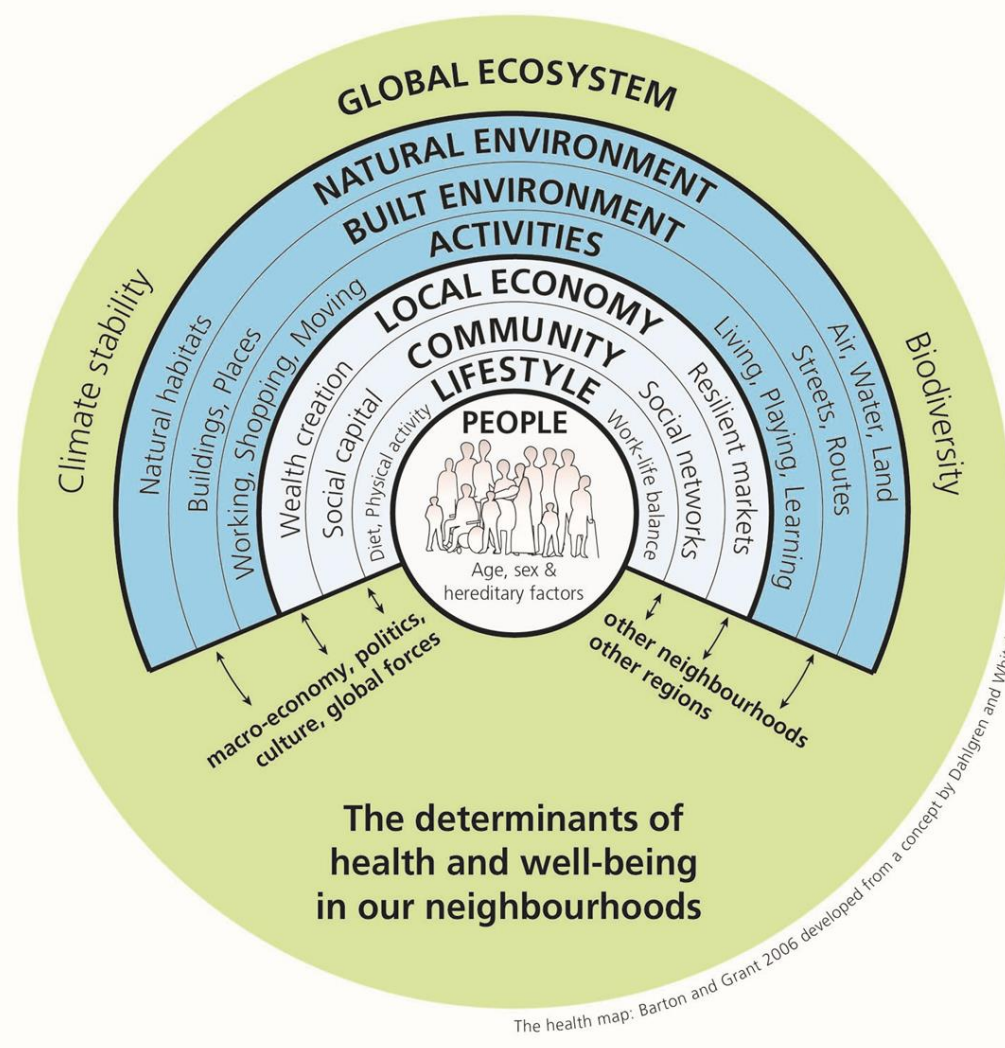
The longer people live in stressful environmental, economic and social circumstances the greater the physiological and psychological effects they suffer, and the less likely they are to enjoy a healthy old age. These disadvantages tend to concentrate among the same people, and the effects on health are cumulative. Health inequalities are estimated to cost the Welsh economy £1.8 - £1.9 billion in productivity losses and £1.1 - £1.8 billion in welfare costs per year (Public Health Wales, 2019b). Evidence indicates that the COVID-19 pandemic is further exacerbating these inequalities. People who were not in good health prior to the pandemic have been exposed to the most impact on their physical and mental health (NRW, 2020, Unpublished).

Inequality is a relatively well understood concept: it illustrates the difference in access to and use of scarce and valued resources among individuals or social groups. This may be related to the resources they hold as individuals (education, income, social and cultural capital and so on) or to their position in society (housing, employment situation). This is a social inequality. Inequalities can also be spatial: some places do not benefit from the same services or economic dynamics as others: for example, digital access. Environmental inequalities intersect socio-economic and spatial inequalities, and this burden is borne primarily by socially and/or spatially disadvantaged and/or vulnerable populations.

Those most vulnerable in society, or in vulnerable situations, such as the elderly, those living in relative poverty, the inactive, the unemployed, those at risk of flood or

those living in areas of poor air quality or high levels of environmental noise, are at a higher risk of increasing health burdens and lower levels of healthy life expectancy because of known and avoidable environmental risk. These challenges can exacerbate the use of natural resources and increase pressure on ecosystem goods and services. The move towards health prevention to ease the burden on the NHS and associated services provides amplified opportunity for increasing the resilience of ecosystems and human health.

Whilst healthcare plays an important role, many other factors have a greater influence on health - genetics, environment, the society in which people live and work, income, behaviour patterns and access to services. These significant and sustainable factors relate to what are known as the 'wider determinants of health' as illustrated in the Barton and Grant Health Map (Barton and Grant, 2006, developed from the model by Dahlgren and Whitehead, 1991) in Figure 3. The Health Map shows the relationship between human health and social, economic, cultural and environmental influence. Together they illustrate the close association between the built and natural environment within which people live, the lifestyle choices that are adopted and the availability of accessible services.



Global ecosystem - climate stability and biodiversity are vital for human survival. Our ecosystems provide the food we eat, the water we drink and the air we breathe.

The natural and built environment and the activities that we undertake in these provide the basis for health with the provision of equitable, clean and safe environments helping us to thrive.

Working and learning: being engaged in some form of employment, volunteering, education or training is good for individuals, the community and the economy as a contributor towards wellbeing, fulfilment and creativity.

Resilient communities and healthy lifestyles: our wellbeing depends on our lifestyle choices, the interactions we share with others, our involvement in community, and our sense of control over our local environment.

Infrastructure

Interactions

Figure 3 A health map for the local human habitat (Barton and Grant 2006),
 (Source Barton and Grant, 2006 developed from the model by Dahlgren and Whitehead, 1991)

The wider determinants of health are the range of environmental, social and economic services that people have access to, that directly and indirectly influence physical and mental health and are reliant on resilient and biodiverse ecosystems. The synergies between these are inherently complex. For example, people depend on regulating services for health protection, particularly air and water quality as well as the impacts of heat and noise. Cultural ecosystem services help form a sense of place and sense of self through interactions with, and connections to, natural resources. Many of the required actions to achieve healthier and more resilient environments for people will have co-benefits in such areas as mitigating climate change and combating the loss of biodiversity.

Ecosystem services can impact positively, negatively or with unintended consequences on the way people are able to live their lives: those opportunities, services and amenities that are available to them and how this subsequently affects physical and mental health. To maximise the benefits, it's important to recognise how interconnected and interdependent policies, priorities, decisions and processes need to be.

For example, active travel routes developed alongside green infrastructure provide a win-win: safe routes with users shielded from the worst effects of noise and traffic emissions, alongside the provision of sustainable drainage, water filtration, flood risk reduction and habitat connectivity.

Key regulatory service challenges

Air pollution

Air quality in Wales is regulated through legislation and permitting. The Air Quality Standards (Wales) Regulations 2010 set out the regulations that relate to the measurement, assessment and management of ambient air quality (Welsh Government, 2010).

Air pollution has a significant effect on public health, and poor air quality is the greatest environmental risk to human health in the UK. Costs to society are estimated at more than £20 billion every year. Exposure to air pollution reduces life expectancy and can exacerbate asthma, affect lung function and increase respiratory and cardiovascular hospital admissions and mortality. The systemic effects can extend beyond the cardiopulmonary system to affect many other organs, with studies showing possible effects including dementia, low birth weight and diabetes (Royal College of Physicians, 2016).

Poor air quality in the UK is estimated to cause 40,000 early deaths annually (Air Quality Expert Group, 2020), with 2,000 deaths in Wales alone, which amounts to 6% of total deaths (Public Health Wales, 2016a). While emissions in Wales and the UK continue to be above recommended levels those most vulnerable within communities will continue to accumulate health burdens. The effects of air pollution disproportionately affect those in deprived areas, as illustrated in Figure 4 (Public Health Wales, 2016a).

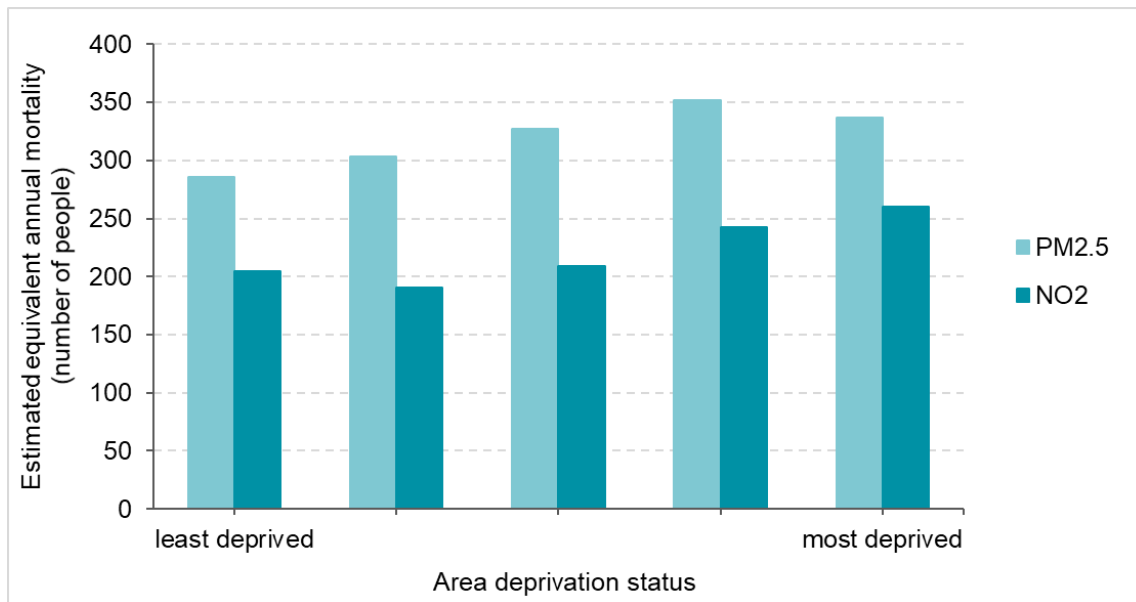


Figure 4 Estimated annual mortality attributed to PM2.5 and NO2 by deprivation status across LSOAs in Wales. Based on all-cause non-accidental mortality data for over 30 year olds between 2011 and 2013. (Public Health Wales, 2016a).

Emerging evidence indicates that the COVID-19 pandemic has had short term positive effects on urban air quality. Satellite imaging shows approximately 4% reduction in global emissions of small particle matter (PM_{2.5}) and nitrogen dioxide (NO₂). This was short term and caused by travel bans and closure of some workplaces and manufacturing sites, also reducing road and industrial noise levels. Long-term reductions are yet to be evaluated. (NRW, 2020, unpublished).

The recently published Clean Air Plan for Wales (Welsh Government, 2020a) includes an important focus on improving air quality to benefit human health. Figure 5 illustrates the levels of average nitrogen dioxide concentrations at local authority level against the Wales average (Public Health Wales, 2020).

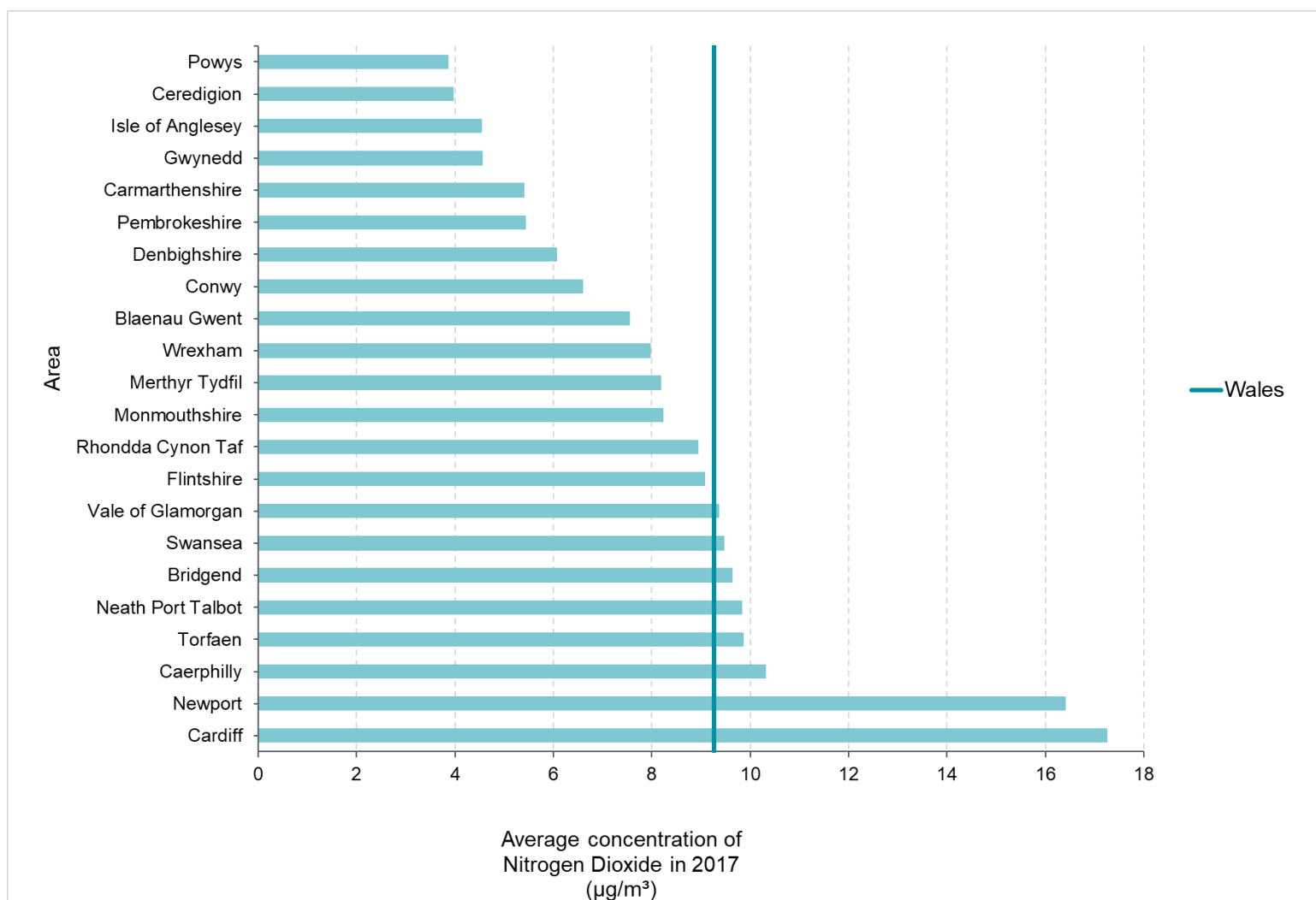


Figure 5 Nitrogen dioxide (NO₂) concentration by Welsh Local Authority at residential dwelling locations, 2017 (Public Health Wales, 2020. Uses modelled air quality data (DEFRA), Mid Year Estimates and dwelling counts (ONS). This is a national indicator. Please consult the [technical guide](#) for full details).

Waste management pollution

Detailed information and evidence are included in the [Waste Chapter](#), but the following are particularly pertinent for resilient people and places.

Changes in waste management methods mean that there is now less reliance on landfill in Wales and the UK. Whilst emissions from waste management and industry processes released via a stack will be dispersed, any non-stack emissions will be more localised and impact communities in close proximity to the site. Treatment at waste facilities consume additional provisioning resources such as land, water and energy and the leachate produced can be detrimental to local ecosystems.

The use of incineration for waste disposal is increasing across the UK, and whilst incineration processes and emissions are regulated, there is some public concern over possible health risks. As a result of [major health studies carried out by Imperial College, London](#) Public Health England's risk assessment remains that "modern, well run and regulated municipal waste incinerators are not a significant risk to human health. While it is not possible to rule out adverse health effects from these incinerators completely, any potential effect for people living close by is likely to be very small" (Public Health England, 2019).

However, legislation and a permitting regime place monitoring and control measures on facilities to avoid negative impacts. Where a site operates outside of this framework – that is, illegally – there may be both environmental and human health impacts including noise, dust, vermin, odour and fly infestation. Poor waste management can have negative environmental impacts ranging from soil, water and air pollution, all leading to a deterioration in landscape quality.

Waste crime leads to negative impacts on the natural environment and well-being of the population through pollution, nuisance and loss of valuable materials. Legitimate waste businesses are undercut, hindering the economy and sustainable growth of the industry in Wales.

While the cost to legitimate businesses, landowners and the wider economy are difficult to quantify, it is estimated that misclassification, illegal exports and exemption abuses amounted to £15.2 – £32.4 million of economic impact to Wales in 2015/16 (Table 1, NRW, 2017).

Table 1 Estimated costs of waste crime by type in Wales 2015-16 (NRW, 2017).

Type	Cost Range (£m)
Illegal waste sites	£2.3-5.6 million
Waste Fires	£0.7-1.1 million
Fly-tipping*	£4.7-11.8 million
Misclassification	£1.3-7.3 million
Permit breaches	£4.9 million
Illegal exports	£1.3-1.7 million
Total	£15.2-32.4 million

*Fly-tipping costs estimated for those cleared by Natural Resources Wales and Welsh local authorities. Does not include clearance costs for fly-tipping on private land

Waste activities that have significant impacts on human health and the environment are more likely to occur when the waste is:

- in the wrong place / type of facility
- mis-managed
- deliberately mis-described
- of low value, hazardous, or is contaminated

During and after the initial lockdown phases of the COVID-19 pandemic, there have been reports across the UK of increased use and littering of single use plastics such as PPE, littering from fly camping and socialising in green and blue spaces. Conservation agencies also reported that there has been a significant increase in single use plastic found in marine environments. Media accounts of fly-tipping during the lockdown period were widely circulated, however there is no objective data yet to support this – data is expected for Wales in late 2020. Additionally, there was an increase in domestic waste collection UK-wide, due to people being primarily at home with reduced access to waste management facilities (e.g. recycling centres). However, not all domestic waste (renovation and de-cluttering) can be collected from the roadside and this has led to a suggested increase in unlicensed waste carriers resulting in a perceived rise of dumping of waste illegally (fly-tipping). (NRW, 2020, Unpublished).

Noise pollution

Excessive noise seriously harms health and interferes with daily activities at school, work, home and during leisure time. It can disturb sleep, cause cardiovascular and psychophysiological effects, reduce performance and provoke annoyance responses and changes in social behaviour. Noise pollution from traffic is ranked second amongst environmental threats to health (the first being air pollution, to which traffic-induced emissions and tyre debris contribute).

At least one million years of healthy life are lost annually in Europe because of noise pollution (World Health Organisation, 2011). Noise pollution is more likely to affect those living in urban areas, who are also more likely to be affected by other environmental, social and spatial inequalities. Twenty seven percent of people in urban areas were bothered by noise compared with 18% in rural areas of Wales (Welsh Government, 2019a). For more detail see the [Urban ecosystems chapter](#).

Emerging evidence on urban noise during the UK wide lockdown period highlights a reduction in urban noise levels as a result of less travel, and industrial activity. The evidence suggests an increase in 'nuisance' noise such as music, anti-social behaviour, loud voices, dogs and DIY (NRW, 2020, unpublished).

Water pollution

Pollution is currently the most acute issue facing freshwater ecosystems, specifically pollution from agricultural slurry, sewage, mine waters and soil erosion. Contaminated water requires additional treatment before it is fit to drink. Contamination also reduces the aesthetic and recreational value of watercourses. Discharges from foul sewers were responsible for 75% of all water industry-related pollution incidents reported to NRW between 2014 and 2019.

The dairy industry was responsible for more than 50% of all agricultural pollution incidents reported to NRW between 2014 and 2019. Beef and farm infrastructure and land management (farmyards, tracks, manure heaps etc) were responsible for smaller but still significant sources of pollution. See also [Freshwater Natural Resource Register](#).

Agricultural pollution in Welsh rivers is regulated by the Water Resources (Control of Agricultural Pollution) (Wales) Regulations 2020. Pollution incidents from agricultural sources include milk entering river systems, slurry run-off into river systems, fertiliser nitrates and livestock management causing soil degradation and riverbank erosion.

The greatest threat to recreational waters across Europe is diffuse pollution from agricultural land (UK NEA, 2011a). The use of water for recreational activity is intrinsically linked with local economies through the tourism industry, and the quality of such water is thus of considerable importance to tourism-reliant communities. In Wales this is particularly relevant for marine waters and coastal communities, where the impacts of water pollution, including littering, flotsam and jetsam washed ashore and run-off from coastal and inland freshwaters can cause aesthetic, amenity, environmental health and ecological impacts that in turn effect the services provided to people. The increasing calls for some inland freshwater systems to be classified

as bathing waters will require increased testing, adherence to current regulation and potential new regulation.

After a long period of improvement, in 2019 100% of marine bathing waters met the minimum standard and 83% were assessed as excellent. Some issues remain with the standard of shellfish waters protected areas, but improvements have been made.

Of the 55 estuarine and coastal water bodies around Wales, 24 fail the standard for dissolved inorganic nitrogen, however these failures rarely lead to excessive growth of algae or impacts on the ecosystem. Since 1990, trends in phosphorus loads have gone down but there is no significant trend in discharges of nitrogen from catchments to the sea.

In 2019, an average of 475 litter items per 100m stretch of beach were recorded (see also [Marine Natural Resource Register](#)).

A pilot initiative at 90 sites across the UK to utilise wastewater as a surveillance tool for COVID-19 monitoring was launched in October 2020. Research suggests wastewater can successfully be used as a surveillance tool however this is matched with concern about contamination and public health protection (NRW, 2020, unpublished).

Land use and soils

The way land is used and managed provides important regulating services (climate regulation, air quality, flood and drought mitigation) that benefits human health and well-being.

Since the beginning of the COVID-19 pandemic in the UK there has been a shift to more positive relationships with food. More than 19 million UK residents say they are cooking more from scratch and 3 million people have tried a vegetable box scheme. More people than ever are interested in growing their own food with a growth in sales of seeds and compost. Conversely, there is worsening access to healthy foods with the number of families using food banks doubling. There has been a 175% increase in the need for emergency food supplies. There was a shift to buy essential items from locally sourced food chains through local food markets and producers as food sourced through large chain supplies was difficult to obtain. (NRW, 2020, unpublished).

Land affected by contamination can pose a risk to both human health and the wider environment. It is an issue jointly regulated by local authorities and NRW, with responsibility for human health and controlled waters primarily falling to each respectively. The planning process is regarded as the main mechanism for providing the opportunity to remediate land contamination as part of the cycle of land redevelopment and regeneration, bringing land previously affected by contamination back into beneficial use. However, some potentially contaminated sites cannot be dealt with in this way and may continue to pose a risk to health and/or the environment

Land use change to increase tree cover, increasing sustainable management of soil, peatland restoration and renewable energy have been identified to contribute to

decarbonisation policies, nature recovery and to contribute to flood and drought mitigation and the supply of clean air and water. More detail can be found in the cross-cutting theme [Land Use and Soils Chapter](#). The decrease in air and ground travel during the initial lockdown period of the COVID-19 pandemic was a conduit for increased awareness of climate change and the growing impacts on human health and nature. Support for decarbonisation measures increased during this period. (NRW, 2020, Unpublished).

Invasive non-native species

Rising temperatures are changing species migration patterns and enabling a northward 'creep' of warmer temperature flora and fauna. Invasive non-native species (INNS) established in the UK are directly impacting on human health and that of the environment.

Examples include non-native deer exacerbating the spread of Lyme disease, giant hogweed causing skin rashes and blistering and the oak processionary moth whose caterpillars can cause skin irritation and breathing difficulties. The Asian hornet has killed six people in France through anaphylaxis and since 2016 there have been 17 confirmed sightings in England and nine nests destroyed (Commons Select Committee, 2019). Mosquito and tick migration pose the most common threat to human health and are spread through human movement of goods or vehicles or by migratory and domestic animals.

Studies show that several vector-borne diseases have emerged in Europe in recent years including West Nile Fever, vivax malaria and tick-borne encephalitis. These diseases are carried by vectors such as sand flies, ticks and mosquitos and whilst the UK already has mosquito species able to transmit malaria and ticks that transit Lyme disease, the UK is also threatened by invasive mosquito species capable of transmitting West Nile fever, the Zika virus and Dengue fever (Baylis, 2017).

INNS have a significant impact on well-being, affecting recreational activities, exacerbating flooding, restricting access and, in some instances, directly impacting physical health (Pejchar & Mooney, 2009). They are one of the main issues affecting biodiversity loss, costing the economy of Wales more than £125 million annually and costing human health in Wales an estimated £5.8 million a year in 2010 (Williams et al., 2010).

Flood risk

Across Wales in 2019, there were approximately 245,000 properties at risk of river and/or marine flood (NRW, 2019). Flooding can cause death, illness, injury and stress, with impacts possibly far greater for more socially vulnerable communities (Lindley et al., 2011). The provision of flood warnings and activation of flood defence mechanisms – including nature-based solutions where feasible - not only prevent loss of life but allow people to act to protect themselves and their property. These can help to reduce the impact of other adverse health effects such as anxiety about flooding as well as injury or exposure to contaminants. Twenty eight percent of residents in Wales are concerned about the risk of flooding in their area (Welsh Government, 2019a).

Key cultural service challenges & opportunities

Physical health

Physical inactivity, diet and obesity levels pose a significant burden of disease risk factors in Wales. Fruit and vegetable consumption has declined while the prevalence of overweight or obesity has increased. If current trends continue, 66% of adults will be overweight or obese by 2025. A higher proportion of children in Wales report unhealthy lifestyle behaviours and being overweight or obese than in other UK nations: 27% of 4 to 5-year olds and 22.5% of 15-year olds are overweight or obese. Wales also has the lowest percentage of girls who are physically active for 60 minutes every day (8%) (Welsh Government, 2019a).

Outdoor recreation, sport, learning, playing and volunteering opportunities all facilitate increased physical activity levels, accruing health benefits associated with tackling many of the key health issues in Wales, particularly the rise in obesity and Type 2 Diabetes levels (Welsh Government, 2019a).

Healthy, active and resilient natural and built environments provide opportunities for people to be physically active outdoors. Evidence shows that when asked about their most recent visit to the outdoors in Wales, 25% of respondents had visited a park or other local space, 19% the beach, sea or coastline, 14% woodland or forest and 6% a river, lake or canal (Welsh Government, 2019a).

More recent evidence compiled during the UK wide COVID-19 lockdown period shows that those living in urban environments, where access to green and blue space is limited, are experiencing the most impact on their physical and mental health. People living on low incomes, who were least active before the COVID-19 pandemic found it harder to be physically active. Men (for leisure) and key workers (active travel) were more likely to cycle, with walking for leisure and home-based activities (16-34-year olds) reported to be popular as a result of the lockdown control measures. Women were more predominant users of walking in green space locally. They were also more likely to enjoy playing informal active play/games in the garden with children. There has been an increase in cycling both on weekdays and weekends. The reduction in car use meant more people were using cycling for active travel, especially keyworkers. (NRW, 2020, Unpublished).

Access for people to non-urban outdoor spaces is primarily via the Public Right of Way (PRoW) network and designated Open Access land, the majority of which are on or through agricultural land. There are approximately 33,000km (20,750 miles) of PRoW in Wales and almost all the land contained within the mountain, moorland and heath ecosystem is designated as Open Access land. A large proportion of the population of Wales live in close proximity to the coast, a largely free recreation and health resource.

Walking remains the most popular outdoor recreational activity (76%) (Welsh Government, 2019a), and while most recreational users act responsibly in the

outdoors some do cause damage to vulnerable habitats. Honey-pot and more vulnerable sites can be damaged through overuse, littering and anti-social behaviour. Agricultural land is a vital habitat in the UK, but management regimes can result in negative impacts, including those associated with greenhouse gas emissions, diffuse water pollution, flood risk and losses to biodiversity. These problems often emerge in communities at a distance from the source.

The COVID-19 pandemic has increased awareness of the importance of being active with nearly two-thirds of adults in Wales feeling that it is more important than ever, with walking (under 2 miles), the most popular activity. However, despite this awareness, in Wales overall levels of physical activity have not shifted significantly, despite noticeable variations with those from deprived areas. The largest impact has been on children who do not have access to safe, accessible outdoor spaces, people aged 70 and over and those not in good health whom are most likely to spend less time outdoors (NRW, 2020, Unpublished).

Use of urban parks, playgrounds and other green and blue spaces can lead to increased levels of physical activity and reduced levels of obesity in adolescents, while improvements to the quality of parks can encourage children and older people to visit more often. However, the control measures introduced for the COVID-19 pandemic have impacted the use of green space: social distancing and closure of some urban green spaces has meant that those living there had less space for exercise, relaxation and socialisation. This is having adverse physical and mental health outcomes. Increased use of some outdoor sites has caused localised congestion and, in some places, a negative effect on the local community. (NRW, 2020, Unpublished).

Tree cover in deprived areas tends to be lower and relatively less 'rich'. For example, in Rhyl, where several small areas fall within the most deprived 10% of areas in Wales, all wards except one have less than 10% canopy cover, and the most deprived Rhyl West ward has only 2% cover. Across Wales as a whole, 63% of least deprived wards have cover greater than 15%, whereas only 23% of more deprived wards have greater cover than 15% (NRW, 2014).

Mental health

The mental health benefits of exposure to, and engagement with, natural landscapes and their contribution to general psychological health and well-being is well evidenced (Bragg and Atkins, 2016). The wildlife, landscapes and seascapes of Wales are a rich source of inspiration for many forms of artistic and cultural expression. These interactions with - and connections to - nature, play an important role in maintaining mental health and provide opportunities to improve physical health. Studies show that children with ADHD showed greater improvement in behaviour whilst in woodlands than in urban areas: this may be linked to tranquillity (Horwitz et al., 2015). Woodlands are also often found to be catalysts for social interaction and cohesion.

Fifty two percent of people living in Wales agree there is a sense of community in their local area, and 85% of people are satisfied with their area as a place to live (Welsh Government, 2020b). But urban living can often limit access to nature and

increase exposure to air and noise pollution, alongside increasing anxiety and stress levels and lowering levels of social cohesion.

Bodies of freshwater, lakes, rivers, wetlands and streams provide a sense of place and often act as a physical boundary between communities. Research shows that freshwaters are often valued for their existence even if people do not visit them (UK NEA, 2011b). Many designated landscapes in Wales (Areas of outstanding natural beauty, National Nature Reserves, Sites of Special Scientific Interest and National Parks) contain areas of enclosed farmland and associated patterns of crops, buildings, field enclosures and management regimes which provide a sense of place and appreciation of nature valued by residents and visitors. Visitors have high levels of satisfaction with the natural environment and culture of Wales (Welsh Government, 2019b).

Doorstep opportunities to access nature and greenspace are of vital importance. Local nature reserves and Sites of Interest for Nature Conservation along with ad hoc areas of greenspace are an important resource for people living in more urban and peri-urban areas, often providing the only opportunity for access to and interaction with nature and wildlife.

Evidence to date indicates that a positive outcome of the COVID-19 pandemic is an increased wildlife presence in certain areas. This is accompanied by an increase in public appreciation for wildlife meaning that many people have had a positive experience of the natural environment. Connections to nature have increased. There has been a renewed appreciation of green space, especially locally. Women, children and families in particular are spending more time outdoors in contact with nature, which helps to form stronger social bonds.

Levels of participation in nature activities increased significantly, particularly in urban areas. 60% of people say they are seeing more wildlife. 42% have increased levels of gardening activities. Surveys undertaken during this period show that adults in Wales and Scotland believed looking after their mental health was important, particularly being physically active outdoors to manage stress. (NRW, 2020, Unpublished).

The economy

Ecosystems form the basis of the economy. Thousands of people work in farming, forestry and fisheries in Wales (41,000 in 2018) (Stats Wales, 2019), all of whom depend on natural resources. Thousands more are employed in the tourism and recreation industries, whose key resource is Wales' natural environment and the opportunities it provides for physical activity, enjoyment and relaxation. Tourism is a key contributor to, and driver of, the economy in Wales. There are over 132,000 people directly employed in the visitor economy, around 9.5% of the workforce. In 2018, there was £6.3 billion of visitor spending, generating £3 billion in Gross Value Added (GVA). This is a contribution of around 6% GVA to the Welsh economy (Welsh Government, 2019b). While 12% of employment in Wales in 2015 was in the energy and environment sector, employment in food and farming was less than 5% (Welsh Government, 2016). Young people leaving school in the most deprived areas of Wales were half as likely to leave with skills and qualifications (level 2) as those

from the least deprived areas. Around one in five 19 to 24-year olds are not in education employment or training.

The global recession currently being experienced as a result of the COVID-19 pandemic has significant wider impacts on multiple determinants of health as well as financial cuts to government budgets. This may, in future, impact on the sustainable management of natural resources. Emerging evidence shows multiple negative economic effects from market disruptions, leading to increased health risks for farmers and other food processors and their local communities. Examples are sickness, lack of seasonal farm workers, and changes in consumer demand/behaviour. These impacts are exacerbated for marginalised groups when in conjunction with other social and environmental stressors (NRW, 2020, Unpublished).

Tourism has been heavily affected by the pandemic, with businesses and the extended economy hit during some of the peak holiday times of the year. Many UK residents are now choosing to stay in the UK for day trips, short breaks and holidays instead of flying abroad, which is good for the economy but is increasing human impacts on some honeypot sites (NRW, 2020, unpublished).

As a result of the pandemic, some environmental non-governmental organisations have seen work stop or slow considerably, resulting in a loss in income. This has a wider impact on volunteer conservation work, partnership working, biodiversity work, planning and research, economic sustainability and future funding. The significant shift to working from home has meant that there has been a decrease in site monitoring of natural spaces and some biodiversity protection and conservation work is under threat (NRW, 2020, Unpublished).

Although many people in Wales already enjoy, appreciate and understand the natural world, there are considerable challenges to connect people to the natural environment. Developing a sustained connection, knowledge, understanding and interaction with nature ideally begins in early childhood through play and learning outdoors to establish an emotional connection to nature. Progressing through formal and informal nature-based learning develops an understanding of the natural world and the human impact on it and allows people to take a personal position on their behaviour and commitment to protect and maintain natural resources and influence others to do so.

Recent evidence from research undertaken in relation to the COVID-19 pandemic shows outdoor education being advocated as a tool for home schooling and the safe reopening of schools. There is also wider recognition that outdoor space is part of the classroom with learners having the further benefit to their physical and mental health (NRW, 2020, Unpublished).

Opportunities for action to achieve healthy places

Wales's diverse ecosystems, the state, trends and prospects for each are detailed in the [eight ecosystem chapters](#) and [Natural Resource Registers](#) that make up SoNaRR 2020. Ecosystems must provide clean air, water and land, thereby decreasing exposure to environmental risks. Inevitably there are hard decisions to make, trade-offs to negotiate and synergies to maximise both within and between ecosystem types. For example, the restoration of riparian woodland to aid flood regulation may enhance landscape and opportunities for recreation, a synergy, but novel crops that are not familiar or liked by some stakeholders, thereby reducing their mental well-being, may offer the most efficient carbon capture, a trade-off.

These synergies and trade-offs have been explored in the relevant [Natural Resource Registers](#) for each of the ecosystems that make up the natural environment.

Wales should not shy away from making these hard decisions, ensuring that the multiple benefits to the environment and to the people of Wales are maximised through the sustainable management of natural resources. It is known that access to, and benefits derived from, ecosystem services in Wales are not distributed equally or equitably. It is known that deprived communities in Wales suffer the cumulative effects of that deprivation, contributing to ill-health and shorter lives. The COVID-19 pandemic has served to highlight those same deprivations and Wales's green recovery provides a focused opportunity to amplify and maximise the progress towards a sustainable and resilient environment.

Maximising the use of nature-based solutions, maintaining Wales's distinctive, special landscapes and historic environments, and building up resilience to climate change and biodiversity loss will help optimise physical health, mental well-being and placemaking. It is this approach, combined with the equitable distribution of, and access to, amenities, services and goods, and access to and interactions with nature that create thriving, healthy people and places. Wales has much of the regulatory and policy frameworks in place, but the public, private and third sector in Wales need to act faster and more effectively, in more joined up ways, and at a larger spatial scale, building on increasing public awareness of the climate and nature emergencies to win support and influence behaviour.

The current COVID-19 pandemic is possibly the greatest global shock in recent times. Coming on top of Wales's existing climate and nature emergencies, the pandemic has had an unprecedented impact on the Welsh economy. Rural Wales and parts of the South Wales Valleys have experienced the highest level of business closures, and it is these areas that already have relatively weak economies and, in the Valleys, poor population health. Further, more businesses in Wales have seen a greater fall in turnover than elsewhere in the UK (Bevan Foundation, 2020).

The lockdown measures that have been necessary to control the spread of COVID-19 have slowed economic activity and disrupted lives - but have also given glimpses of a possible brighter future. In some places, pollution levels have dropped to such an extent that people have breathed clean air, seen blue skies and clear waters, or

have been able to walk and cycle safely with their children for the first time in their lives. Natural England's People and Nature Survey is collecting evidence on the role of nature on people's health and well-being including during COVID-19. Initial results show that most of the population believe in the importance of green and natural spaces as places to support mental health (89%), and that being in nature makes them happy (87%) (Natural England, 2020a). By late September 2020, 74% of adults were worried about the effect of COVID-19 on their life right now; the highest proportion since restrictions started easing at the end of May when this percentage was 67% (Office of National Statistics, 2020b). In addition, a recent survey conducted by YouGov and commissioned by the RSPB shows the invaluable role of nature in helping people recover within the context of current circumstances (RSPB, 2020). In England, when asked to reflect on the period since the coronavirus restrictions began, 41% of people stated that visiting local greenspaces was more important than ever to their well-being and 30% reported visiting local green and natural spaces more (Natural England, 2020b).

The use of digital technology has accelerated new ways of working and connecting with each other, from reducing time spent commuting, to more flexible ways of studying and spending more time with family. Opinion polls from around the world show that people want to protect the environment and preserve the positives that have emerged from the crisis as society recovers. It is known that clean air, water, soils and energy, less noise and less waste are positive consequences of continued decarbonisation, a regenerative economy and a societal shift towards health prevention models. Resilient ecosystems and policies to improve public spaces provide a foundation for healthy and active environments for people and for nature.

There is no doubt that COVID-19 and the subsequent government response have had and continue to have an on-going profound effect on the everyday lives of everyone. As the situation continues to evolve, it has become increasingly clear that both the disease and the responses to it are having wide-ranging impacts on the health and well-being of the population. Many of these impacts are significant and will extend beyond the short term. Although everyone has been affected in some way by COVID-19, the impacts for some people have been, and will continue to be, far starker than for others. COVID-19 has served to amplify existing inequalities.

As appreciation for the complexity of health and well-being increases, there is a growing need to understand the underlying causes of current health trends. This will support a shift towards a more preventative system, and move towards the aim of better, more equal and more sustainable health outcomes. The sustainable management of ecosystems and the services they provide form part of the foundational response required.

The four opportunities for action

Figure 6 illustrates the interrelatedness of our four areas of focus, with resilient and diverse ecosystems providing multiple health and well-being benefits. In order to make this work effectively the sustainable management of natural resources should maximise the benefits derived to the environment and to people through positioning a joined-up, systemic consideration of environmental and human health at the centre of all policy development and decision making.

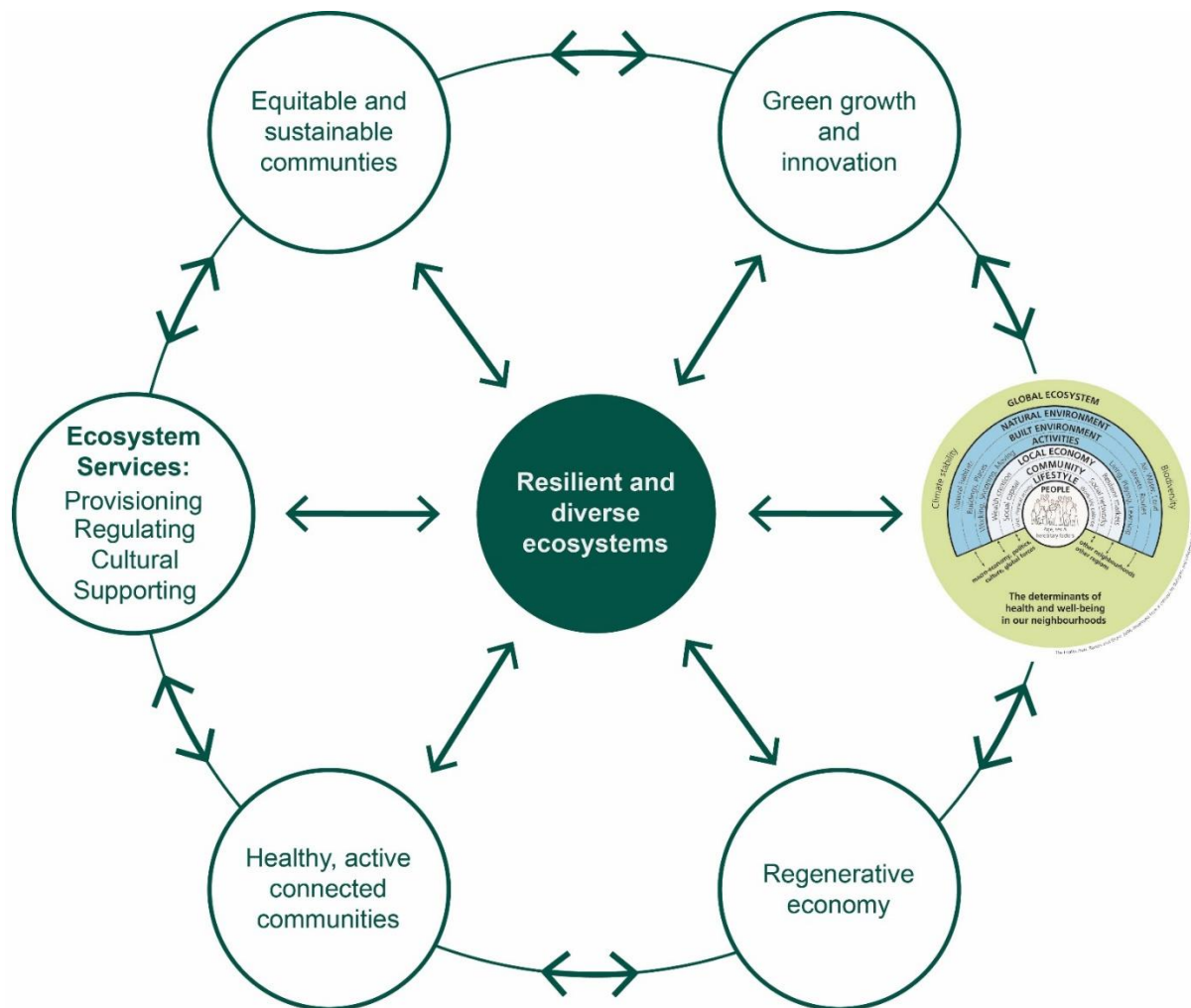


Figure 6 The interrelated nature of the four SoNaRR aim 3 opportunities for action and their connection to ecosystem resilience and services

Steps towards this are already being taken in Wales through a ‘health in all policy’ approach. Health in all policies is an established approach to improving health and health equity through cross-sector action on the wider determinants of health: the social, environmental, economic and commercial conditions in which people live. For Wales to successfully create healthy places for all people, free from environmental risk, then this approach needs further recognition and adoption across the public, private and third sector policy landscape.

Each sector relies on the positive ecosystem service benefits derived from the environment and equal access to them. Decisions made affecting one opportunity for action will have consequences, positive, negative or unintended, across one or more

of the others. They should not be considered in isolation from each other, nor in isolation from the environmental gains that can be achieved.

For example, a sustainable and systemic improvement in air quality will involve policies across agriculture, industry, transport, land use planning, housing, energy, employment and health.

A transition to net-zero carbon has the potential to yield more than £90 billion of annual benefits to the UK because of the wider improvements to the environment and human health, alongside unlocking opportunities for innovation and employment (Vivid Economics, 2020).

Large-scale changes that Wales is experiencing include increasing demands for energy, transport and technological innovation, urbanisation and the increased mobility of people, goods and services, all of which, in turn, make demands on the environment and subsequently the services it can deliver. Yet health, well-being and socio-economic equity is still rarely central to decisions made about responses to these demands, resulting in missed opportunities to build resilience.

Equitable and sustainable communities

Socioeconomic inequalities, related to income, employment and education, as well as demographic differences such as age or gender, occur together with unequal exposure to environmental risk factors. They contribute to health inequities and most often put disadvantaged groups at significantly higher risk for environmental health effects. In Wales almost a quarter (23%) of households live in relative income poverty, and this figure has remained largely unchanged for a decade (Welsh Government, 2020c). Accessible and affordable amenities and services, good quality housing, education and integrated transport systems all contribute to creating and sustaining communities.

Poorly planned and managed urban settings with unsustainable transport systems and a lack of access to public and green areas increase air pollution, noise and heat islands, reduce opportunities for physical activity and access to decent jobs and education, and have a negative impact on community life and people's physical and mental health. COVID-19 has highlighted the inadequate, and unequal, access to private or shared gardens with black people 4 times more likely to have no outdoor space at home (Office for National Statistics, 2020). Recent Welsh Government planning policy: 'Building Better Spaces - The Planning System Delivering Resilient and Brighter Futures' highlights the need for a post COVID-19 recovery to recognise the importance of the climate and nature emergencies along with health and well-being in all planning policy (NRW, 2020, Unpublished).

Because greenhouse gases (climate change) and air pollutants impacting human health often originate from the same sources, Wales has the opportunity to gain the health, economic and environmental multiple benefits by developing transport and energy systems based on renewable energy. While the policy framework is already in place, new approaches are needed that consider the consequences of actions in their entirety, taking a longer-term and equality-based perspective.

Important aspects to consider

Housing conditions affect people's health and energy use. Eighteen percent of homes in Wales pose an unacceptable risk to health, and 12% of households are in fuel poverty. Damp and mouldy homes increase respiratory problems by between 30% and 50%, especially in children (Public Health Wales, 2019c).

Investing in energy efficient homes lowers energy use, reduces overall energy demand in the economy and makes individual households, and Wales, more resilient to fuel price fluctuations.

Consideration of the embodied energy consumed in manufacturing, delivering and installing the materials used to build, refurbish and fit-out a building, and their disposal at end of life is crucial to help build a regenerative economy as well as lowering energy consumption within the home.

Delivering affordable and high-quality new housing in the right locations, density and design creates opportunities for growing food, for outdoor play and learning, integration with existing services and infrastructure, proximity to public transport, green active travel routes, and access to biodiverse, high quality green and blue space and nature.

Existing housing stock can be retrofitted to improve energy efficiency and reduce fuel poverty.

Integrated and sustainable transport options prevent the negative effects of current transport patterns on human health and improve ecosystem resilience. Thirty percent of car journeys in Europe cover distances of less than 3 km; 50% cover less than 5 km. These distances can be covered within 15–20 minutes by bicycle or 30–50 minutes by brisk walking (World Health Organisation, 2020b).

The use of public transport in the UK is around 95% less than the same period last year (2019), with reductions in visits and length of stay at UK transit stations of up to 75% in March (NRW, 2020, Unpublished). These have rebounded since, but the reductions remain significant. These reductions are of course in response to the COVID-19 pandemic, but significant behaviour change is required to increase public transport use.

Sustainable transport policies promote active mobility and public transport use. Such policies help reduce air pollution, noise and greenhouse gas emissions, energy consumption and congestion, as well as improving road safety and offering better protection of landscapes, and urban cohesion.

Social distancing measures, owing to COVID-19, has led to many local authorities implementing extended pavement measures allowing room for walking and cycling. Some have included green infrastructure, however in many instances short-term expedience has been the priority and the inclusion of green infrastructure is limited to a few schemes (NRW, 2020, unpublished). Green infrastructure along walking and cycling routes provides multiple benefits for people and the environment and should form part of a holistic approach.

Green infrastructure within transport networks provides opportunities for carbon capture, shade, traffic calming, habitat connectivity, sustainable drainage, water and air filtration and noise reduction. Managing road verges for biodiversity also makes good financial sense.

A mix of transport policies provides opportunities to create new jobs or to green existing jobs and can provide opportunities to develop appropriate skills for a regenerative economy.

Flood risk reduction measures in both marine and freshwater ecosystems decrease disruption and damage to infrastructure, homes and businesses. While around 1500 homes and businesses in Wales were affected by flooding between 2016 and 2019, the overall number of properties at risk is around 245,000. Environmental, social and economic pressures such as climate change, population growth and continued squeeze on resources means the management of flood and coastal erosion risk must adapt.

Increased use of natural interventions, green engineering, coastal adaptation and catchment-wide approaches all help to reduce risk, improve resilience and create more sustainable schemes that deliver wider environmental and well-being benefits.

There is still a need to build and maintain sustainable flood defences, but also to recognise the importance of improving awareness and understanding of risk, encouraging people to act to improve their own resilience. A shift in behaviours can take time but this can be accelerated with incentives and social approaches to improving community flood responses.

Healthy, active and connected communities

Increasing access to green and blue spaces and providing community facilities to bring people together is highlighted as a ‘best buy’ to prevent mental ill health and improve mental well-being (Public Health Wales, 2016b). Public health approaches to deliver social, economic and environmental benefits, such as safe green and blue spaces and active transport, have been shown to be cost-effective with potential returns on investment (Public Health Wales, 2016b). People living closer to good-quality green and blue space are more likely to be physically active, to use it and to use it more frequently (UK Parliament, 2016).

The COVID-19 pandemic has increased the public’s awareness of their surroundings. Great importance has been placed on access to green infrastructure, such as local green and blue space, especially close to home, as well as the importance of visits to enjoy broader landscapes such as beaches and National Parks. This awareness has enhanced physical activity, mental health and also highlighted the importance of early connections through outdoor learning for a life-long appreciation of the natural environment (NRW, 2020, unpublished).

Considering green and blue spaces and their connectivity as ‘infrastructure’ works because simple things like trees, hedges, green walls, brown roofs, green and blue spaces and watercourses can provide valuable services in an ecologically friendly way. Green infrastructure can provide shelter, travel routes, access opportunities, sustainable drainage, pollution mitigation and food production as part of a wider

ecosystem. It has the added benefit of enhancing habitats and creating attractive places that can enhance personal well-being. It is also multifunctional, operating at different scales in any number of situations.

Recent Welsh Government planning policy: 'Building Better Spaces - The Planning System Delivering Resilient and Brighter Futures' highlights the need for a post COVID-19 recovery to recognise the importance of the climate and nature emergencies and health and well-being in all planning policy. Emerging evidence indicates that the pandemic has had a disproportionate impact on those with little or no access to green and blue spaces highlighting the need to plan for good quality spaces for people to live, work and relax in (NRW, 2020, unpublished).

Important aspects to consider:

Placemaking promotes people's prosperity, health, happiness, and well-being in the widest sense. It delivers connected, mixed use neighbourhoods with access to services and amenities that encourage physical activity, energy efficiency, social interactions, safe play and learning opportunities. Socio-economic and health inequalities are lower in greener neighbourhoods and the poorest areas tend to be those with the least available good quality public green and blue space (University of Exeter, 2020).

Green and blue space contributes to noise attenuation, reduces the negative effects of air pollution, provides tranquil settings for social interaction and cohesion, while contributing to climate and biodiversity resilience, flood risk mitigation, and combatting urban heat island effects.

Placemaking encourages environments that enable behaviour change related to choices of energy use, transport, living and food, waste generation and general consumption.

Access to good quality public and green open spaces is essential for people of all ages and abilities, including accessible and safe play and recreational areas for children and young people. Converting lawns around public buildings to biodiverse meadows makes environmental and financial sense.

Supporting the identification, with Public Services Boards, local communities and landowners, of place-based opportunity spaces for woodland creation and tree planting will enhance people's connection to nature and deliver the multiple environmental and human health benefits provided by trees and woodlands.

Active travel builds physical activity into everyday lives and can help mitigate against environments that encourage unhealthy diets which can lead to obesity. It can help reduce air pollution, noise and greenhouse gas emissions, energy consumption and congestion, as well as improve road safety and offer better protection of landscapes and urban cohesion. Increased physical activity also reduces the risk of many noncommunicable diseases and obesity. Active and sustainable transport policies can also provide opportunities to create new jobs or to green existing jobs.

Wales needs walking and cycling infrastructure for people of all ages and abilities: access to safer walking, cycling, green and public spaces and public transport. This will support mobility, physical activity, recreation opportunities, access to services and social interactions, and reduce the use of energy and resources.

The combination of active travel routes alongside green infrastructure offers a win-win situation: safe routes for purposeful journeys with users shielded from the worst effects of noise and traffic emissions, alongside the provision of sustainable drainage, water filtration, flood risk reduction and habitat connectivity.

Connections to nature: Research suggests that people with a greater connection to nature are more likely to behave positively towards the environment. Experiencing nature is also thought to provide health and well-being benefits. By being in, and connecting with, the natural environment, an individual has the potential to become an active, healthy, responsible, ethical citizen able to influence others. 48% of people who think the world's climate is changing thought that change was primarily caused by human activity - an increase from 38% in 2016-17 (Welsh Government, 2019a). Building connections to nature at an early age may help to encourage positive environmental behaviour throughout the life-course.

Learning in, about and for the natural environment should begin in early years through outdoor play and learning outside the classroom. Confidence and competence can be developed as part of the national curriculum and out of school activities in both formal and informal settings.

Potential skills gaps and employment opportunities in the environmental sector can be addressed through a focus on volunteering, placements and apprenticeships to foster an understanding of, and care for, the nature and climate emergencies. In particular, the relationship between the sustainable management of land and of fresh and marine waters could be addressed through additional emphasis on these dependencies within post-16 education.

Innovative skills and new technologies are required for a regenerative economy which include green infrastructure management and use for construction and development in the form of materials, tools and methods.

Green growth and innovation for healthy communities

Society is continuing to experience large scale changes with increasing demand for energy, transport and technology, increased urbanisation, mobility and demand for goods and services. Economic growth and development should not be to the detriment of the environment but must ensure the sustainable use of natural resources, through smart and innovative technologies, renewable energy generation, social procurement and nature-based solutions. In 2018/19 14% of people in Wales had taken action by switching to a green energy supplier, and 73% of people would support policies to make more use of renewable energy (Welsh Government, 2019c).

Important aspects to consider:

Nature-based climate solutions contribute to carbon sequestration and biodiversity and have a large impact on air pollution and quality of life.

Increase low carbon management agricultural practices using measures such as improving livestock health, precision farming for crops, preventing soil compaction, applying biochar, anaerobic digestion, controlled release fertilisers, livestock and manure management. These farming practices can have multiple other benefits including improved productivity, improved air, water and soil quality, reduced pests and diseases and improved soil structure. Reduction in compaction reduces run-off, soil erosion and water course turbidity.

Growing those sectors which deliver environmental gains through emission reductions, environmental jobs will help places adapt to shifting economic and labour markets.

Investment in green infrastructure projects will maximise wider benefits such as the creation of local jobs, training opportunities and support the move to a low carbon, resource efficient economy. Agroforestry and hedgerow expansion on farmland will help sequester carbon and increase ecosystem services provided whilst maintaining the primary purpose of food production.

Local and strategic planning for energy efficiency, renewable energy, smart grids and nature-based solutions to flooding and overheating will help towards a zero-carbon infrastructure. Creating 'space for tree' zones around towns and cities and woodland habitat networks, delivered through Unitary Development Plans and Area Statements will provide multiple benefits to people and to place.

Changes to the way people work in Wales – as illustrated by the COVID-19 pandemic – can bring real benefits in terms of less travel, fewer emissions and cleaner air. Increasing home working in the longer term needs increased connectivity, at faster broadband speeds. This is particularly pertinent in more rural areas where connectivity is already poor.

Increasing resource efficiency and moving toward a regenerative economy

Whilst more detailed information can be found in [Aim 4](#), the following are of importance for healthy places and healthy people. There will undoubtedly be trade-offs to consider and manage. For example, there may be financial implications for the water and waste industries, local authorities and businesses from addressing the pathways of marine litter effectively. In the widest sense, these implications could be offset by the resultant improved water quality leading to an increase in services provided for well-being.

Managing the lifecycle of natural resources, from extraction through the design and manufacture of products, to what is considered as waste is essential to green growth and a fundamental part of developing a resource efficient, regenerative economy where little or nothing is wasted.

Smarter design allowing products to be repaired, re-used and recycled makes economic sense, and a greener economy has potential for job opportunities and new growth: across Europe it is estimated that the net savings generated by businesses through innovation, waste prevention and re-use of raw materials is up to EUR 600 billion (European Commission, 2020).

The regenerative economy can provide high-quality, functional and safe products, which are efficient and affordable, last longer and are designed for reuse, repair, and high-quality recycling. A range of sustainable services and digital solutions can bring about a better quality of life, innovative jobs and upgraded knowledge and skills.

Important aspects to consider:

Reducing environmental and carbon footprints can be advanced through focusing on sectors that use the most resources and where there may be greater potential for re-use and recycling, such as vehicles, plastics, construction and water industries. That circularity can be expected to have a positive net effect on job creation if workers acquire the skills required by the transition. The potential of the social economy, which is a pioneer in job creation linked to the regenerative economy, could be further leveraged by the mutual benefits of supporting the green transition and strengthening social inclusion. The primary objective of traditional social economy enterprises is to serve the members and not to obtain a return on investment as the traditional mainstream capital companies do. The members act in accordance with the principle of solidarity and mutuality. Their main objective is to have a social, societal or environmental impact for the general interest. They include cooperatives, mutual societies, non-profit associations, foundations and social enterprises.

Carbon removal can also be nature based, including through restoration of ecosystems, forest and salt marsh protection and restoration, afforestation, sustainable forest management and carbon farming sequestration, or based on increased circularity, for instance through long term storage in wood construction, re-use and storage of carbon in products such as mineralisation in building materials.

Evidence Needs

While the evidence concerning the specific risks to healthy places of issues such as air quality, waste, water and agricultural pollution is clear, the evidence relating to the relationships between access to nature and well-being does have limitations. It is known that living in greener environments has a range of positive health outcomes, and that targeted interventions have potential for success. It is also known that awareness raising of climate and nature issues is not enough in and of itself to create long lasting behaviour change.

Less is known about those interventions or factors that promote health related use of the environment, how interventions can be targeted to promote health and how benefits to population health can be achieved through environmental interventions, without amplifying health and social inequalities.

Longitudinal behaviour change studies for the establishment of pro-environmental behaviours and for building connections to nature from childhood to adulthood are lacking in Wales.

Evidence is continually emerging from research carried out across the UK, Europe and the world regarding the positive, negative, and unclear consequences of the global COVID-19 pandemic, on people, the environment and the ecosystem services it provides. The evidence cited within this chapter related to COVID-19 and its effects are what is known as of October 2020. As the situation further evolves new evidence will be available that will allow us to update current approaches and Wales's response to the nature and climate emergencies.

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